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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,698	01/20/2004	Hardayal Singh Gill	HSJ9-2003-0235US1	3353

32112 7590 07/19/2006

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EXAMINER

CHEN, TIANJIE

ART UNIT PAPER NUMBER

2627

DATE MAILED: 07/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/761,698

Applicant(s)

GILL, HARDAYAL SINGH

Examiner

Tianjie Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 16 is/are rejected.
- 7) ☒ Claim(s) 1-15 and 17-21 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

Non-Final Rejection

Specification

1. The disclosure is objected to because of the following informalities:

- In Specification, p. 7, line 13; "pinned layer 60" should be changed to --pinned layer 58--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-8 and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

- Claim 1 recites "net magnetic moment $dM=0$." However, Applicant has define M as 'magnetic magnetization" in Specification, p. 9, line 1, and it is well known that the magnetization is the value of magnetic moment divided by volume. Therefore, it is not clear that Applicant is to claim the differential of the magnetizations being zero or the net magnetic moment being zero.
- Claims 3 and 11 recite " $dM=0$ corresponds to dT less than 5×10^{-10} meters, where magnetic thickness $T = M \times t$, and M equals magnetization, t equals thickness of material, and dT is the differential in the layer thicknesses." As

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recited by Applicant in Specification, p. 9, line 1 that M has unit of emu/cm^3 ; therefore, dT should have unit of emu/cm^2 ; rather than unit of meter. It is not clear what Applicant intends to claim.

It makes any person skilled in the art to which it pertains, or with which it is most nearly connected cannot make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 2-8 are rejected for their dependence from claim 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 4-6, 9, 10, 12-14, and 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Freitag et al (US 6,741,432).

Claims 1 and 9, Freitag et al shows a disk drive in Figs. 1 and 2 including: at least one hard disk; at least one magnetic head adapted to fly over the hard disk for writing data on the hard disk, and having an air bearing surface, the magnetic head including: a read sensor in Fig. 8 including: at least one primary pinned layer 816; a barrier layer 618; a free layer 820 (Column 8, lines 11-12); an in-stack biasing structure 824 have zero net magnetic moment since magnetic moment 878 and 879

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have opposite sign and identical magnitude (Column 8, lines 61-64), which acts to stabilize the free layer by exchange coupling.

Claims 2 and 10, Freitag et al also shows that the in-stack biasing structure 824 includes paired layers 771 and 773 of opposite magnetic orientation which are separated by a spacer layer 772, such that the net magnetic moment of the paired layers is substantially zero (Column 8, lines 61-65).

Claims 4 and 12, Freitag et al further shows that the in-stack biasing structure 824 includes a self-pinned layer pair 771 and 773 (Fig. 8, column 7, line 31).

Claims 5 and 13, Freitag et al further shows that the at least one primary pinned layer 816 includes a pair of primary pinned layers 751 and 753, separated by a spacer layer 752 (Column 7, lines 17-25).

Claims 6 and 14, Freitag et al further shows at least one layer 714 of AFM material which acts to pin the pair of primary pinned layers (Column 7, lines 60-62).

Claim 17, Freitag et al shows a method of fabrication of a read head sensor, including: A) fabricating at least one primary pinned layer; B) fabricating a free layer above the at least one primary pinned layer; and C) fabricating an in-stack biasing structure having $dM=0$, which acts to bias the free layer by exchange coupling.

Claim 18, Freitag et al shows that the in-stack biasing structure includes a self-pinned layer pair.

Claim 19, Freitag et al shows that at least one primary pinned layer includes a pair of primary pinned layers, separated by a spacer layer.

Claim 20, Freitag et al shows fabricating at least one layer of AFM which acts to pin the pair of primary pinned layers.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 7, 11, 15, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinarbasi in view of Pinarbasi (US 6,865,062).

Claims 3 and 11, Freitag et al does not show the thickness of the layers. Pinarbasi shows a self-pinned layer 304, wherein that an exemplary dt is the thickness difference between layers 318 and 320, which is 7×10^{-10} meters (Fig. 11), does not show it is less than 5×10^{-10} meters. However, Applicant does not shows any unexpected result from dt is less than 5×10^{-10} meters not equal or less than 7×10^{-10} meters. Freitag et al only shows an exemplary value of $dt = 7 \times 10^{-10}$ meters, which does not exclude the value of dt being less than 5×10^{-10} meters. One of ordinary skill in the art would have been motivated by Pinarbasi's teaching to find a suitable value of dt , which would includes a value of less than 5×10^{-10} meters.

Claims 7, 15, and 21; Freitag et al does not show that the pair of primary pinned layers are self-pinned layers.

Pinarbasi shows a primary pinned layer 204 in Fig. 10, which includes a pair of primary pinned layers 218 and 220, which are a self-pinned (Column 8, line 3). Pinarbasi further teaches that using his self-pinned layer (Column 4, line 61 to column 5, line 15) the amplitude output and magnetostriction uniaxial anisotropy field are significantly improved while maintaining a high magneto resistive coefficient

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(Column 5, lines 13-15). One of ordinary skill in the art would have been motivated to apply self-pinned structure taught by Pinarbasi into Freitage et al's device to improve amplitude output.

Allowable Subject Matter

5. Claim 8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claim 16 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

- With regard to claims 8 and 16, as the closest reference, Freitag et al (US 6,741,432) shows a read sensor including: at least one primary pinned layer; a barrier layer; a free layer; an in-stack biasing structure have zero net magnetic moment, which acts to stabilize the free layer by exchange coupling; but fails to show that the read sensor is of Current Perpendicular to the Plane (CPP) configuration.
- Applicant asserts "the present invention that the overall thickness dimension of the read sensor is reduced, allowing the head to be made smaller" (Specification, p. 4).

Conclusion

6. The prior art made of record in PTO-892 Form and not relied upon is considered pertinent to applicant's disclosure.

- US 7,072,154 to Gill et al shows that "The magnetization of a layer is defined by the magnetic moment per unit volume" in column 10, lines 30-31.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is 571-272-7570. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on 571-272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


TIANJIE CHEN
PRIMARY EXAMINER